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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/885,332
Filing Date	June 20, 2001
First Named Inventor	Batakrishna MANDAL
Art Unit	2123
Examiner Name	T. H. Stevens
Attorney Docket Number	1391-24800
Total Number of Pages in This Submission	25

ENCLOSURES *(Check all that apply)*

- [x] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) ______
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [x] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [ ] Other Enclosure(s) (please Identify below):

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	CONLEY ROSE, P.C.		
Signature	Alan Christenson		
Printed name	Alan D. Christenson		
Date	November 28, 2005	Reg. No.	54,036

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

Signature	Ella R. Sisco		
Typed or printed name	Ella R. Sisco	Date	November 28, 2005

PTO/SB/17 (12-04v2)
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Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL
For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT	($) 500.00

Complete if Known	
Application Number	09/885,332
Filing Date	June 20, 2001
First Named Inventor	Batakrishna MANDAL
Examiner Name	T. H. Stevens
Art Unit	2123
Attorney Docket No.	1391-24800

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): ____________

☑ Deposit Account Deposit Account Number: 03-2769 Deposit Account Name: Conley Rose, P.C.

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☑ Charge fee(s) indicated below
☐ Charge fee(s) indicated below, **except for the filing fee**
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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES Fee ($)	FILING FEES Small Entity Fee ($)	SEARCH FEES Fee ($)	SEARCH FEES Small Entity Fee ($)	EXAMINATION FEES Fee ($)	EXAMINATION FEES Small Entity Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims ______ - or HP = **Extra Claims** 0 x **Fee ($)** ______ = **Fee Paid ($)** 0

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims ______ - or HP = **Extra Claims** 0 x **Fee ($)** ______ = **Fee Paid ($)** 0

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims
Fee ($) ______ **Fee Paid ($)** ______

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets ______ - 100 = **Extra Sheets** ______ / 50 = **Number of each additional 50 or fraction thereof** ______ (round **up** to a whole number) x **Fee ($)** ______ = **Fee Paid ($)** ______

4. OTHER FEE(S) **Fees Paid ($)**

Non-English Specification, $130 fee (no small entity discount) ______

Other (e.g., late filing surcharge): Fee Code 1402 -- Filing A Brief In Support of An Appeal 500.00

SUBMITTED BY

Signature	Alan Christenson	Registration No. (Attorney/Agent) 54,036	Telephone (713) 238-8000
Name (Print/Type)	Alan D. Christenson		Date November 28, 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant:	Batakrishna MANDAL	§	Confirmation No.:	3294
Serial No.:	09/885,332	§	Group Art Unit:	2123
Filed:	June 20, 2001	§	Examiner:	Thomas H. Stevens
For:	Acoustic Logging Tool Having Quadrupole Source	§	Docket No.:	2000-IP-002325

APPEAL BRIEF

Mail Stop Appeal Brief – Patents Date: November 28, 2005
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Appellant hereby submits this Appeal Brief in connection with the above-identified application. This paper is filed in response to the Office Action dated June 8, 2005 and the Notice of Appeal filed via facsimile on October 6, 2005.

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest is the Assignee, Halliburton Energy Services, Inc. The Assignment from Assignor Batakrishna Mandal was recorded on May 31, 2001, at Reel/Frame 011924/0352.

II. RELATED APPEALS AND INTERFERENCES

Appellant is unaware of any related appeals or interferences.

III. STATUS OF THE CLAIMS

Originally filed claims:	1-17.
Claim cancellations:	Claim 9.
Added claims:	None.
Presently pending claims:	1-8 and 10-17.
Presently appealed claims:	1-8 and 10-17

IV. STATUS OF THE AMENDMENTS

Appellant filed an Amendment After Notice of Appeal on October 12, 2005, to correct typographical errors in Figures 5C, 6C and 7C. Specifically, the label "TIME (μS)" was replaced with "FREQUENCY (kHz)". These amendments are supported, at least, by paragraphs [0026]-[0027] of Appellant's specification. Appellant assumes these amendments have been or will be entered.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The following provides a concise explanation of the subject matter defined in each of the claims involved in the appeal, referring to the specification by page and line number and to the drawings by reference characters, as required by 37 C. F.R. § 41.37(c)(1)(v).

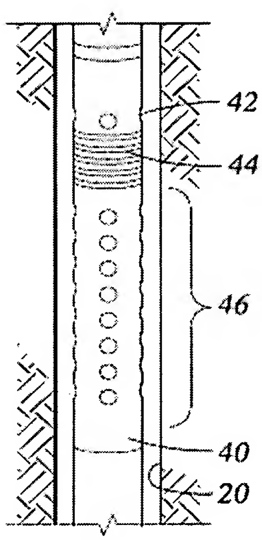

Fig. 2

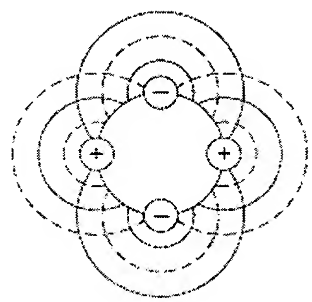

Fig. 4C

The invention of claims 1 and 13 is directed to, among other things, an acoustic logging tool (40) that operates in a quadrupole mode (see Fig. 2, Fig. 4C and paragraphs [0015] and [0019]). The acoustic logging tool (40) includes an internal controller (not shown) and an array of acoustic receivers (46) (see paragraph [0016]). The internal controller is configured to record signals for each of the acoustic receivers (46) and to process the signals to determine a shear wave propagation slowness for a formation surrounding the acoustic logic tool (40) (see paragraph [0016]).

The internal controller is also configured to determine a phase semblance as a function of frequency and slowness from the receiver signals (see Fig. 7C and paragraphs [0026] and [0033]). In Fig. 7C, the phase semblance peak (coming out of the page) has a minimum slowness value (~240μs/ft). In some embodiments, the internal controller identifies this value as the formation shear wave slowness (see paragraphs [0033] and [0036]).

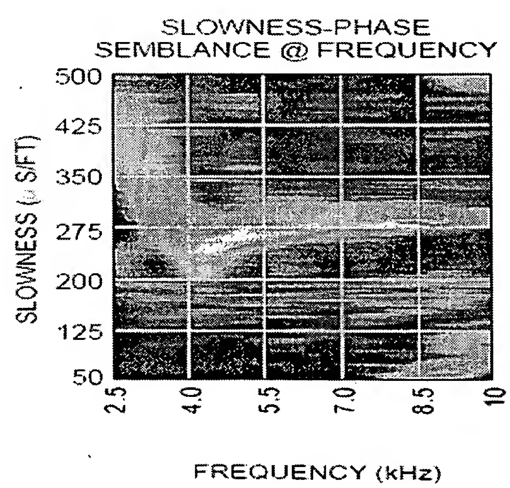

Fig. 7C

For convenience, independent claims 1 and 13 are reproduced below.

1. An acoustic logging tool that comprises:
   - an acoustic source configured to excite wave propagation in a quadrupole mode;
   - an array of acoustic receivers; and
   - an internal controller configured to record signals from each of the acoustic receivers and configured to process the signals to determine a shear wave propagation slowness for a formation surrounding the acoustic logging tool;
   - wherein the internal controller is configured to determine a phase semblance as a function of frequency and slowness from the receiver signals.

13. A method of determining the shear wave propagation slowness of a formation, the method comprising:
   - exciting waves that propagate along a borehole in quadrupole mode;
   - receiving acoustic signals at each of a plurality of positions along the borehole; and
   - calculating, from the acoustic signals, slowness values associated with a peak phase semblance as a function of frequency.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-5, 7-8 and 11-12 are obvious in view of U.S. Patent No. 5,077,697 ("Chang") and U.S. Patent No. 4,562,557 ("Parks").

Whether claim 6 is obvious in view of Chang and Parks.

Whether claim 10 is obvious in view of Chang and Parks.

Whether claims 13, 14 and 17 are obvious in view of Chang and Parks.

Whether claim 15 is obvious in view of Chang and Parks.

Whether claim 16 is obvious in view of Chang and Parks.

VII. OVERVIEW OF CHANG

Chang teaches a logging apparatus for obtaining shear/flexural data at discrete frequencies. Chang's logging apparatus is shown in Fig. 8 below.

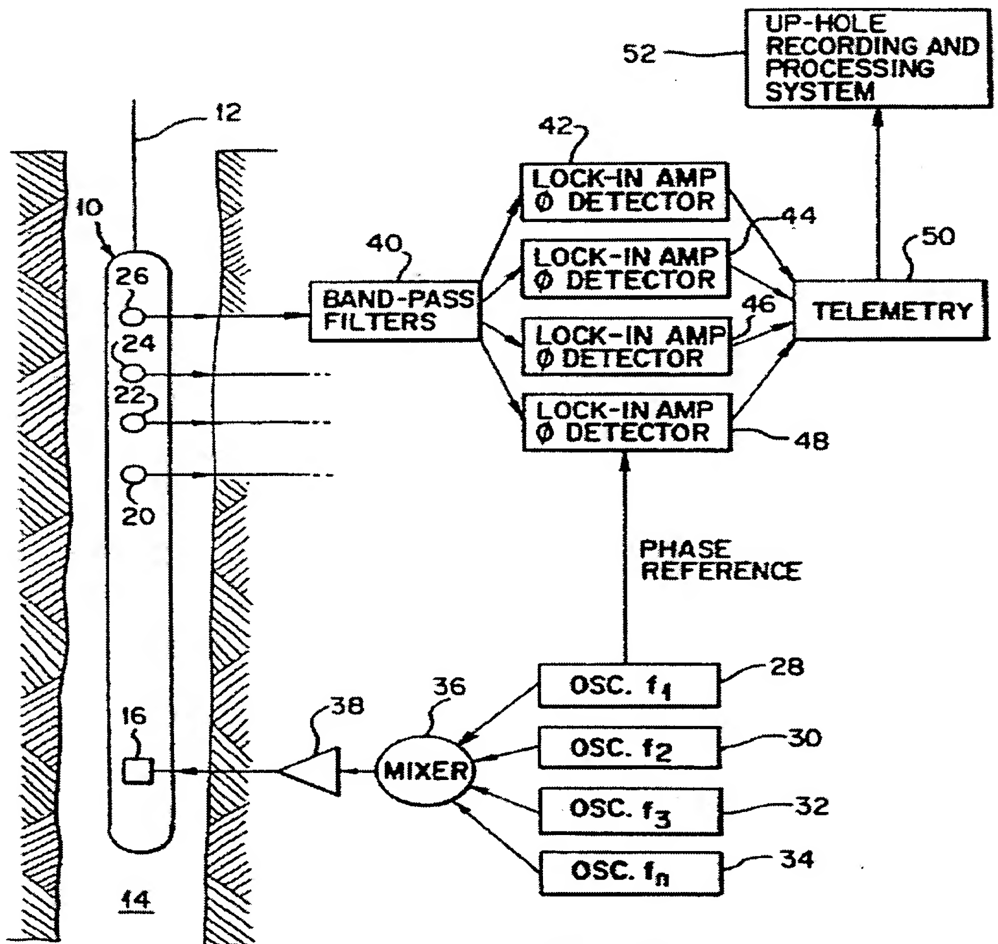

FIG. 8

In describing the logging apparatus, Chang states:

> [The] source transducer 16 induces propagation of shear/flexural waves in the earth formation surrounding the borehole at the prescribed frequency or frequencies. The shear/flexural waves are detected at receiving transducers 20-26.

Col. 9, lines 49-53

> The signal output from each of receiving transducers 20-26 is separated into a respective signal at each of the discrete frequencies of interest (f_1, f_2, f_3,...f_n) by a plurality of band-pass filters [40]...The output signal for each of band-pass filters 40 is supplied to a respective one of lock-in amplifier and phase-detector circuits 42, 44, 46, 48, which detects the amplitude and phase...of the received waves at a respective one of the selected discrete frequencies f_1, f_2, f_3,...f_n.

Col. 9, lines 53-63

> Each of the lock-in amplifier and phase-detector circuits 42, 44, 46, 48, also receives a phase reference signal from a respective one of oscillators 28, 30, 32, 34. The phase reference signals are preferably the signals generated by oscillators 28, 30, 32, 34 for driving source tran[s]ducer 16. Data detected by lock-in amplifiers 32 is passed to conventional telemetry circuitry 50 for transmission to up-hole system 52 where the data is recorded and/or processed.

Col. 9, lines 63 – Col. 10, line 3

While Change mentions quadrupole logging (see col. 13, lines 12-20) and making measurements in the frequency domain (see col. 13, lines 39-62), Chang does not teach or suggest determining phase semblance as required for Appellant's claimed invention.

VIII. OVERVIEW OF PARKS

Parks teaches a method and apparatus for estimating or determining the velocities of various wave components. In describing the method, Parks states:

> The method...generates acoustic energy in the borehole and [receives] that energy...after refraction, reflection and direct transmission through and along the length of the borehole.

Col. 2, lines 40-47

> [A] window is positioned along the composite wave and the energy received is multiplied at each point by the window which is delayed by an amount proportional to the transmitter-receiver spacing. A Fourier transform is generated of that portion of the received energy multiplied by the window to produce a plurality of complex signals in the frequency domain which simultaneously are analyzed to obtain an estimate of the parameters.

Col. 2, lines 49-57

> A clustering technique is utilized to determine the best estimates of slowness and attenuation...The result of clustering is illustrated in Fig. 7. There the data is plotted in three dimensions: slowness, frequency, and time. Clusters 70, 71, 72, and 73 respectively respresent compressional, shear, fluid and Stoneley waves.

Col. 3, lines 7-8 and col. 8, lines 53-69

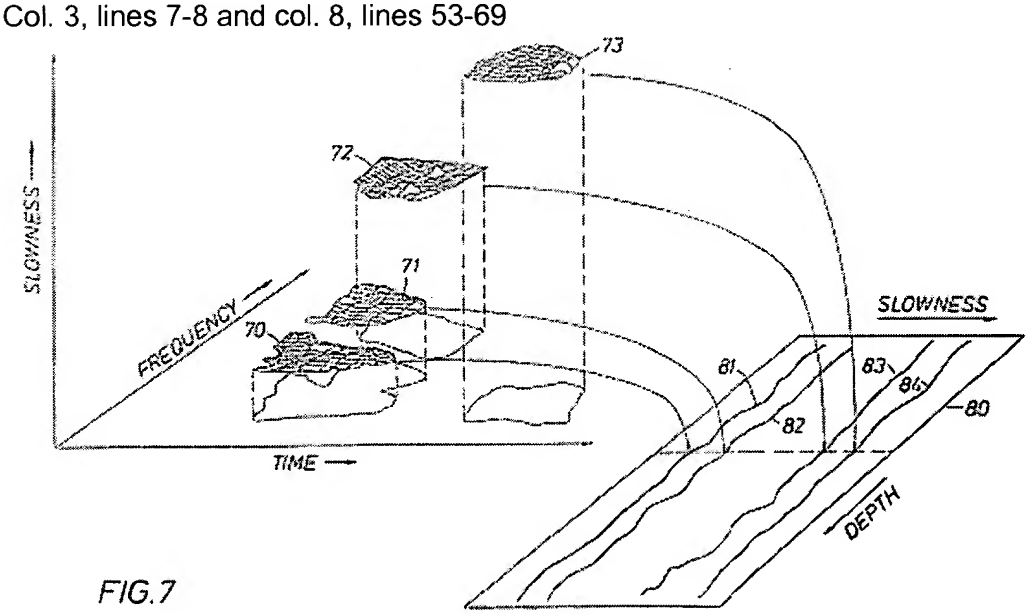

FIG.7

Parks does not teach or suggest determining phase semblance as required in Appellant's claimed invention. As shown in Fig. 7, Parks plots slowness as a function of frequency and time. In contrast, Appellant's Fig. 7C plots phase semblance as a function of frequency and slowness. In Appellant's disclosure, the minimum slowness value that corresponds with a phase semblance peak is identified as the formation shear wave slowness (see paragraphs [0033] and [0036]).

IX. ARGUMENT

The claims do not stand or fall together. Instead, Appellants present separate arguments for various independent and dependent claims. Each of these arguments is separately argued below and presented with separate headings and sub-headings as required by 37 C.F.R. § 41.37 (c)(1)(vii).

A. Claims 1-5, 7-8 and 11-12, with claim 1 representing this group

Claim 1, in part, requires "an acoustic source configured to excite wave propagation in a quadrupole mode" and "determin[ing] a phase semblance as a function of frequency and slowness from the receiver signals." The Examiner argues that Parks teaches Appellant's claimed "determin[ing] a phase semblance as a function of frequency and slowness from the receiver signals" (see Final Office Action, page 4, middle paragraph). Parks, however, does not teach or suggest this limitation. Instead, Parks determines slowness as a function of frequency and time (see Fig. 7 and col. 8, lines 53-68). Chang mentions time semblance (see col. 2, lines 25-41 and col. 6, lines 25-32) but not phase semblance. Neither Parks nor Chang, considered individually or together, teach or suggest "determin[ing] a phase semblance as a function of frequency and slowness from the receiver signals" as required in claim 1. For at least these reasons, claim 1 and its dependent claims 2-5, 7-8 and 11-12 are allowable over the cited art.

B. Claim 6

Claim 6 depends from independent claim 1 and is consequently allowable for at least the same reasons. In addition, claim 6 requires "each of the source elements is aligned with a respective one of the receiver elements in each set of receiver elements." Neither Parks nor Chang, considered individually or together, teach or suggest Appellant's claimed "each of the source elements is aligned with a respective one of the receiver elements in each set of receiver elements." Chang only teaches that "spacing of the receiving transducers is not critical" (see col. 12, lines 67-68) and does not appear to mention any alignment. For at least this additional reason, claim 6 is allowable over the cited art.

C. Claim 10

Claim 10 depends from independent claim 1 and is consequently allowable for at least the same reasons. In addition, claim 10 requires "identify[ing] a phase semblance peak associated with each of a plurality of frequencies" and "identify[ing] a smallest slowness value associated with the phase semblance peak as the shear wave propagation slowness for the formation". Neither Parks nor Chang, considered individually or in combination, teach or suggest Appellant's claimed "phase semblance peak". Furthermore, neither Parks nor Chang, considered individually or in together, teach or suggest Appellant's claimed "identify[ing] a smallest slowness value associated with the phase semblance peak as the shear wave propagation slowness for the formation." Instead, the clustering technique in Parks compares slowness, frequency, and time (see Fig. 7 and col. 8, lines 53-68). As shown in Park's Fig. 7, the smallest slowness value shown corresponds to the compression wave trace 81 and not the shear wave trace 82. For at least these additional reasons, claim 10 is allowable over the cited art.

D. Claims 13, 14 and 17, with claim 13 representing this group

Claim 13 requires "exciting waves that propagate along a borehole in a quadrupole mode" and "receiving acoustic signals at each of a plurality of positions along the borehole". Claim 13 further requires "calculating, from the acoustic signals, slowness values associated with a peak phase semblance as a function of frequency." Neither Parks nor Chang, considered individually or together, teach or suggest Appellant's claimed "calculating, from the acoustic signals, slowness values associated with a peak phase semblance as a function of frequency". Again, Chang mentions time semblance (see col. 2, lines 25-41 and col. 6, lines 25-32) but not phase semblance. Parks is likewise deficient. For at least these reasons, claim 13 and its dependent claims 14 and 17 are allowable over the cited art.

E. Claim 15

Claim 15 depends from independent claim 13 and is consequently allowable for at least the same reasons. In addition, claim 15 requires

"determining a minimum slowness value associated with the peak phase semblance." Neither Parks nor Chang, considered individually or together, teach or suggest this limitation. The clustering technique in Parks compares slowness, frequency, and time (see Fig. 7 and col. 8, lines 53-68) and does not even mention phase semblance. For at least these additional reasons, claim 15 is allowable over the cited art.

F. Claim 16

Claim 16 depends from independent claim 13 and is consequently allowable for at least the same reasons. In addition, claim 16 requires "providing the minimum slowness value as an estimate of the shear wave propagation slowness." Neither Parks nor Chang, considered individually or together, teach or suggest this limitation. Again, the clustering technique in Parks compares slowness, frequency, and time (see Fig. 7 and col. 8, lines 53-68) and does not even mention phase semblance. Also, the minimum slowness value shown in Parks' Fig. 7 corresponds to the compression wave trace 81 and not the shear wave trace 82. For at least these additional reasons, claim 16 is allowable over the cited art.

X. CONCLUSION

For the reasons stated above, Appellant respectfully submits that the Examiner erred in rejecting all pending claims. It is believed that no extensions of time or fees are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required (including fees for net addition of claims) are hereby authorized to be charged to Conley Rose, P.C. Deposit Account No. 03-2769.

Respectfully submitted,

Alan Christenson

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AGENT FOR APPELLANT

XI. CLAIMS APPENDIX

1. (Previously presented) An acoustic logging tool that comprises:

an acoustic source configured to excite wave propagation in a quadrupole mode;

an array of acoustic receivers; and

an internal controller configured to record signals from each of the acoustic receivers and configured to process the signals to determine a shear wave propagation slowness for a formation surrounding the acoustic logging tool;

wherein the internal controller is configured to determine a phase semblance as a function of frequency and slowness from the receiver signals.

2. (Previously presented) The acoustic logging tool of claim 1, wherein the acoustic source is a quadrupole source.

3. (Original) The acoustic logging tool of claim 2, wherein the acoustic source includes four source elements that are equally spaced about the circumference of the logging tool, and wherein opposing elements are excited in-phase, and elements 90° apart are excited in inverse-phase.

4. (Original) The acoustic logging tool of claim 3, wherein each source element includes a piezoelectric transducer.

5. (Original) The acoustic logging tool of claim 1, wherein the array of acoustic receivers includes a set of four receiver elements at each of a plurality of positions along the longitudinal axis of the logging tool, wherein the receiver elements of each set are equally spaced about the circumference of the logging tool.

6. (Original) The acoustic logging tool of claim 5, wherein the acoustic source includes four source elements that are equally spaced about the circumference of the logging tool, and wherein each of the source elements is aligned with a respective one of the receiver elements in each set of receiver elements.

7. (Original) The acoustic logging tool of claim 5, wherein the internal controller inverts signals from two opposing receiver elements in each set of receiver elements and combines the inverted signals with signals from the remaining two receiver elements in the set of receiver elements to obtain a combined signal for each set of receiver elements.

8. (Original) The acoustic logging tool of claim 7, wherein each of the receiver elements includes a piezoelectric transducer.

9. (Cancelled)

10. (Previously presented) The acoustic logging tool of claim 1, wherein the internal controller is configured to identify a phase semblance peak associated with each of a plurality of frequencies, and wherein the internal controller is configured to identify a smallest slowness value associated with the phase semblance peak as the shear wave propagation slowness for the formation.

11. (Original) The acoustic logging tool of claim 1, wherein the tool is configured for logging while drilling.

12. (Original) The acoustic logging tool of claim 1, wherein the source excites waves having frequencies greater than 2 kHz.

13. (Previously presented) A method of determining the shear wave propagation slowness of a formation, the method comprising:

exciting waves that propagate along a borehole in quadrupole mode;

receiving acoustic signals at each of a plurality of positions along the borehole; and

calculating, from the acoustic signals, slowness values associated with a peak phase semblance as a function of frequency.

14. (Original) The method of claim 13, wherein the peak phase semblance is associated with a borehole interface wave.

15. (Original) The method of claim 13, further comprising:

determining a minimum slowness value associated with the peak phase semblance.

16. (Original) The method of claim 15, further comprising:

providing the minimum slowness value as an estimate of the shear wave propagation slowness.

17. (Previously presented) The method of claim 13, further comprising:
processing the acoustic signals to enhance the quadrupole response of a receiver array before said act of calculating slowness values.

XII. EVIDENCE APPENDIX

None.

XIII. RELATED PROCEEDINGS APPENDIX

None.